Offset Credit Stacking[1]

Background Paper for the EPRI Greenhouse Gas Emissions Offset Policy Dialogue Workshop #13

November 2012

I. Background

This paper has been prepared for a workshop to be hosted by the Electric Power Research Institute (EPRI)[2] on November 9, 2012 in Washington, D.C. It is the 13th in a series of workshops sponsored by EPRI since 2008 related to greenhouse gas (GHG) emissions offsets.[3]

This paper summarizes information contained in reports and peer-reviewed journal articles on *offset credit stacking* published by EPRI and other organizations and authors. This paper also summarizes key developments related to credit stacking, including the Climate Action Reserve's (CAR) development of a Nitrogen Management Project Protocol (NMPP).[4] This background paper covers the following topics:

- Introduction to credit stacking;
- Case studies;
- Recent developments;
- Benefits and barriers; and,
- Next steps.

II. Introduction to Credit Stacking

Over the last several decade, environmental credit markets have evolved that create tradable mitigation credits for wetlands, endangered species, water quality, and GHG emission offsets. The creation of markets for environmental mitigation credits offers the potential to offset environmental impacts more cost effectively than "command-and-control," technological, fee-based or single project approaches. In addition, these environmental commodity markets are growing rapidly. The total annual market value of different environmental mitigation credit markets has grown recently from near zero to tens of billions of dollars annually in some cases as shown in Table 1.[5]

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[1] This background paper was prepared by Becca Madsen of Madsen Environmental and Jessica Fox and Adam Diamant of the Electric Power Research Institute. Comments were provided by Royal Gardner, Professor, Stetson University College of Law.

[2] EPRI is a U.S. based non-profit 501(c)(3) organization created in 1973. EPRI brings together its scientists and engineers, as well as experts from academia and industry, to help address societal challenges in electricity, including reliability, efficiency, health, safety and the environment. Learn more about EPRI online at www.EPRI.com.

[3] Background papers and expert presentations from previous EPRI GHG Emissions Offsets workshops are available here: http://globalclimate.epri.com/annual_events__ghg_offset_policy_dialogue.html .

[4] Nitrogen Management Project Protocol, version 1.0, Climate Action Reserve, June 22, 2012. Available online at http://www.climateactionreserve.org/ .

[5] U.S. National Opinion Survey on Stacking Environmental Credits: Definition, Status, and Predictions of Wetland, Species, Carbon and Water Quality Credit Stacking. EPRI, Palo Alto, CA: 2011. 1024803.

Natural Resource	U.S. Federal Guidance / Policy (Year)	Credit Currency	Total Annual Market Value	Credit Price Range
Carbon / GHG emissions (global)	Not applicable. State (CA) and Regional (RGGI) program.	Pounds (lbs) tons CO_2e	$142 billion	$1-$20
Wetlands and streams (U.S.)	Mitigation Banking Regulations (2008), supersedes Mitigation Banking Guidance (1995)	Acres and functions	$1.8-$3.2 billion	$3,000-$653,000[6]
Threatened and Endangered Species (U.S.)	Conservation Banking (2003) (1995 in CA only)	Acres and individuals	$200 million	$2,500-$300,000
Water Quality (U.S.)	Water Quality Trading (2003)	Pounds of nutrients, or similarly specific credit	$10.8 million	• $1.21-$10 (lb Nitrogen) • $3.76-$25.16 (lb Phosphorous)

Table 1
Primary markets for ecosystem services *(derived from EPRI, 2012)*[7]

Recently, conservation projects that have the potential to produce multiple different types of environmental offsets or mitigation credits simultaneously have created a great deal of interest among offset project developer and other stakeholders**.** The possibility of creating and selling credits from the same conservation practice or activity in various environmental markets – referred to as "*credit stacking*" – has lead to a great deal of discussion and debate, and a few on-the-ground pilot projects.

For example, EPRI is involved in the development of a large-scale water quality trading program in the Ohio River basin in Indiana, Kentucky and Ohio.[8] It is conceivable that a farmer participating in this program may reduce the amount of nitrogen fertilizer they use to grow corn and so improve water quality in the basin and reduce fertilizer-related nitrous oxide (N_2O) emissions that may be creditable in the voluntary carbon market. Working with federal and state agencies, EPRI will be testing the potential to develop and transact both GHG emissions offsets and water quality credits from the same conservation practices between 2013 and 2015.

[6] The upper end of the range was for tidal credits in northern Virginia. From Madsen, Becca; Carroll, Nathaniel; Moore Brands, Kelly; 2010. State of Biodiversity Markets Report: Offset and Compensation Programs Worldwide. Available at: http://www.ecosystemmarketplace.com/documents/acrobat/sbdmr.pdf

[7] An Overview of Ecosystem Services: Considerations for Electric Power Companies. EPRI, Palo Alto, CA: 2012. EPRI report # 1024953.

[8] For more information about this EPRI program, see http://www.epri.com/ohiorivertrading .

Meanwhile, the CAR recently highlighted the need to address offset credit stacking as part of the development of its NMPP v1.0. Based on a review of mitigation credit markets in the U.S., CAR identified water quality trading as the only ecosystem service market that presently has the potential to involve credit stacking with GHG offsets credits.

While there has been some limited movement toward implementation of credit stacking, mitigation projects generally have been stymied by confusion about stacking. Some of the confusion is related to the language used to define and discuss this subject area, although consensus is emerging as discussed below. Lack of clear policy related to when and under what conditions credit stacking may be allowed has added to the confusion (see Policy Issues, Section VB). Fundamentally, the debate related to "credit stacking" centers on how the credits may be applied toward regulatory compliance obligations (see Benefits and Barriers, Section V).

A. Terms of Confusion

Restoration and conservation of private lands produces multiple important ecosystem services. For example, a wetland restoration project can result in waterfowl habitat, water filtration, and possibly carbon sequestration.[9] Since the emergence of environmental credit markets, policy-makers, researchers and market participants have been discussing bundled ecosystem services, unbundling services to sell in environmental credit markets, the economic incentives that may be provided by stacked credits, and the danger of "double-dipping." Below is a set of working definitions designed to help bring clarity to key terms related to credit stacking.

Bundling describes "how various natural resource values are represented together under one definable unit."[10] The concept harkens back to legal theory that explains how a property can be owned simultaneously by multiple parties. Property rights are like a bundle of sticks, with each stick representing a distinct and separate right like surface rights, mineral rights, and water rights. Natural ecosystems are bundles of intertwining values and functions. Some environmental credits bundle together multiple functions, like wetland mitigation under the Clean Water Act that is meant to "compensate for the aquatic resource functions that will be lost as a result of the permitted activity."[11]

Unbundling takes the set of values and functions provided, for example, by a tropical rainforest, and separates them out into discrete units or credits (e.g., tons CO_2e, pounds of water quality improvements).

Credit stacking is "establishing more than one credit [type] on spatially overlapping areas, i.e., in the same acre"[12] of land with an implication that the credits can be sold in different environmental commodity markets. Credit stacking, therefore, "unbundles" ecosystem functions that are fungible in the marketplace, and allows the generation and sale of multiple credit types.

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[9] Jessica Fox, Royal C. Gardner, and Todd Maki. "Stacking Opportunities and Risks in Environmental Markets." Environmental Law Reporter Vol 41 February (2011), p. 21.

[10] Fox, Jessica. "Getting Two for One: Opportunities and Challenges in Credit Stacking." Conservation and Biodiversity Banking: A Guide to Setting Up and Running Biodiversity Credit Trading Systems. Carroll, Fox, and Bayon, eds. Sterling, VA: Earthscan, 2008. 171-180.

[11] "Compensatory Mitigation for Losses of Aquatic Resources." 40 CFR Ch. I § 230.93(a). 2010.

[12] EPRI 2011, p. 2-2

Payment stacking is "establishing environmental credits for a best management or conservation practice that was originally funded by the government (via grants, subsidies, payments, etc.)."[13]

Double-Dipping refers to a situation in which a project first sells a bundled mitigation credit that represents many ecosystem services (e.g., wetland credits), and then subsequently sells credits for specific ecosystem services that previously were sold as part of the bundle (e.g., GHG emission offsets). In effect, the necessary mitigation is not achieved because those same ecological values were "used" in the original credit sale.[14] This differs from "double counting" in carbon markets which typically refers to the sale of the same GHG emissions offsets twice.

B. Emerging Consensus

Against the backdrop of a nascent discussion about credit stacking, EPRI led a national survey on environmental credit stacking, published in 2011.[15] This survey represents the first and only broad-scale collection of information on credit stacking, as informed by practitioners in the United States. The survey of 309 credit sellers, researchers, and policy-makers gathered information and opinions on credit stacking, and identified a consensus definition. Eighty three and one-half percent (83.5%) of survey respondents agreed that credit stacking means "**establishing more than one credit on spatially overlapping areas, i.e., in the same acre**," illustrated on the right side of Figure 1.[16] Implicit in this consensus definition is the idea of creating and *selling* more than one environmental credit type on spatially overlapping areas in different credit markets.

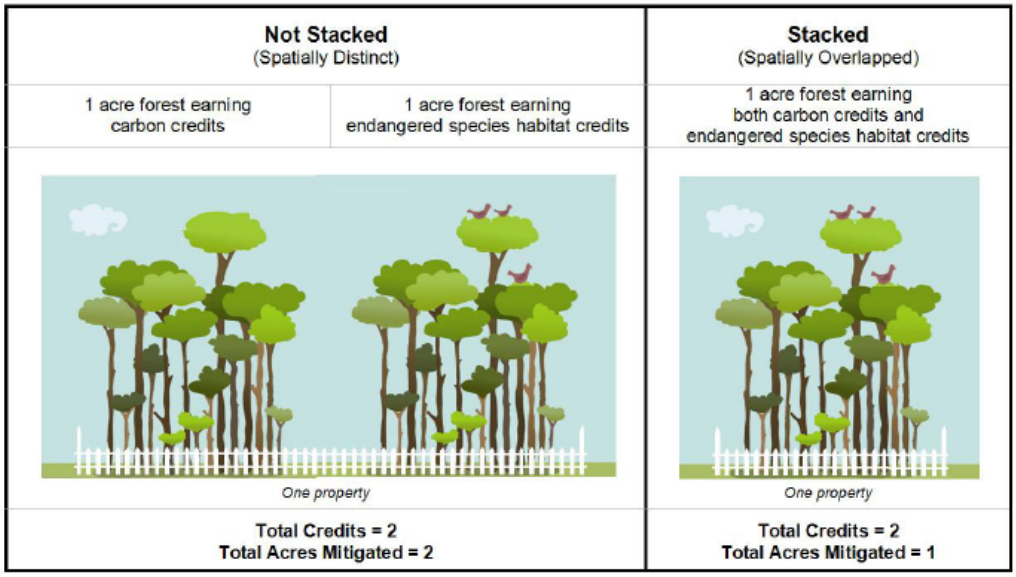

Figure 1
Example of credit stacking *(EPRI 2011)*

[13] EPRI 2011, p. 2-2
[14] Fox 2008, p. 172
[15] EPRI 2011
[16] EPRI 2011, p. 2-2

Since the 2011 *U.S. National Opinion Survey on Stacking Environmental Credits*, additional research papers have sought to further refine the definition of credit stacking. For example, Cooley and Olander (2012) suggested additional parsing of the definition of credit stacking. They proposed the term "*horizontal stacking*" to describe what is illustrated on the left side of Figure 1(which would not be defined as stacking based on the 2011 EPRI consensus definition). They define "*vertical stacking*" to describe the situation depicted on the right side of Figure 1, but include payments outside of environmental markets like Farm Bill conservation programs. Finally, the paper defines the term "*temporal stacking*" as vertical stacking, but with multiple payments at different times (e.g., a payment for a species credit, and a later payment for a GHG emission offset from the same land management activity).

Gillenwater (2011) provides a useful construct for considering the concepts of stacking, bundling, and unbundling, as shown in Figure 2. Building from the Gillenwater illustration, wetland and species banking are exemplified by Figure 2a, "No Stacking, bundled," since credits in these markets represent bundles of ecosystem services. Carbon and water quality credit markets would be represented by Figure 2b, "Stacking and Unbundling", since these credits are defined as functional units that may be unbundled and sold in individual markets. Figure 2c, "No Stacking with Unbundling" could be exemplified by one credit type being generated (e.g., pounds of nitrogen in a water quality trading program), and the "donation" of all other ancillary ecosystem service benefits which are not brought to market in the form of a fungible credit (e.g., pollinator benefits).

C. The Fundamental Issue

The fundamental issue at the heart of the ongoing debate over credit stacking is simple: whether the credits represent *additional* mitigation. The concept of additionality is discussed in more detail in section V below and in a previous EPRI background paper.[17] While additionality can be complex to demonstrate within one market, it may be even more complex when working across multiple markets. The various accounting units used across multiple markets can be a source of complication when trying to demonstrate additionality. For example, wetland and species credits typically are *area-based*, and bundle multiple ecosystem services, such as the provision of wildlife habitat, carbon sequestration, and water purification within one credit, as shown in Figure 2a. Water quality and carbon credits, on the other hand, typically have defined accounting units (pounds and tons carbon-dioxide equivalent [CO_2e], respectively) representing a more defined ecosystem service. If credits are established as bundles, as has been the cases with regards to wetlands and species credits, it is debatable whether it is appropriate to also sell specific accounting units within the bundles.

For example, a wetland bank likely will have a more difficult time unbundling the carbon offset or water quality credits, since they are inherently included under the umbrella of functions in the acre included in the wetland credit. Therefore, credit stacking is only likely to be an issue in those cases in which environmental credits are issued as separate, defined units, such as tons

[17] See *Overview of Different Approaches for Demonstrating Additionality of Greenhouse Gas Emissions Offset Projects,* Background Paper for the EPRI Greenhouse Gas Emissions Offset Policy Dialogue Workshop 2, September 2008. Available online at http://mydocs.epri.com/docs/PublicMeetingMaterials/0809/6CNS9RLUQLS/404416__E230717_Additionality_EPRI%20Workshop2_090208_Final.pdf .

CO_2e for GHG emissions or pounds of phosphorous, as in carbon and water quality markets. This is discussed further in Section III.

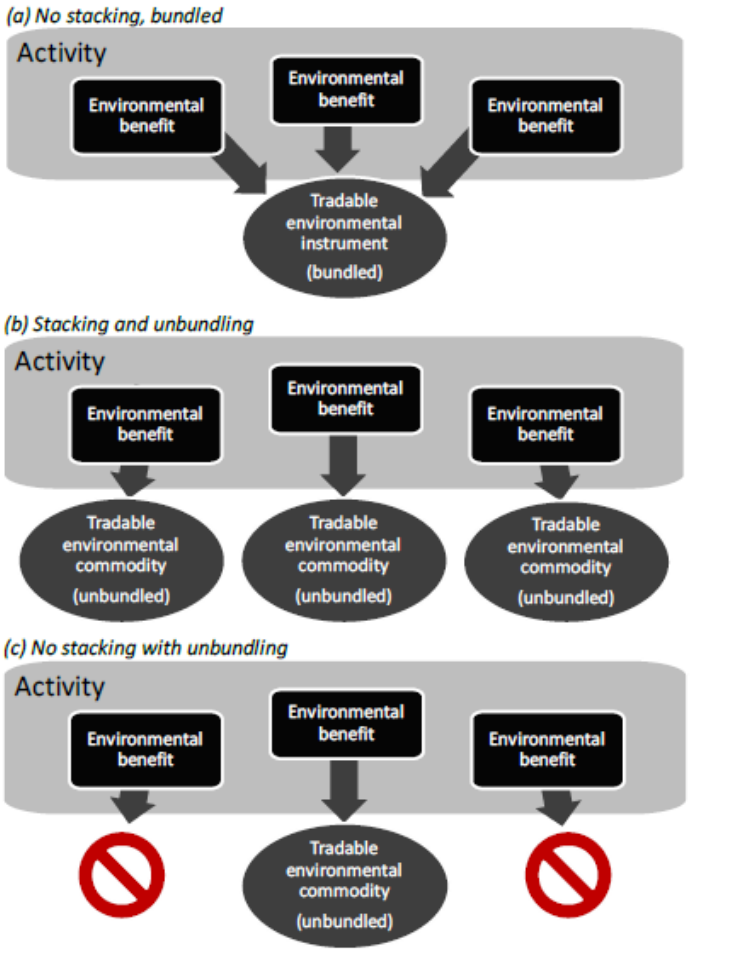

Figure 2
Stacking and bundling configurations for a single activity *(from Gillenwater 2011[18])*

Alongside the evolving definitions, the reality today is that credit stacking is more theoretical than actual. Survey respondents from the 2011 EPRI survey identified a handful of examples of credit stacking being done in practice, with only one project identified that is actually selling more than one credit to offset multiple projects (see Section III "Case Studies"). However, even with the paucity of practical examples of credit stacking, interest in the concept of stacking is high, with 73.6% of respondents stating that they are either already involved in credit stacking, or that they are interested in getting involved in the future (i.e., producing, purchasing, selling, regulating, verifying, buying, monitoring, researching, tracking, and/or trading).[19]

[18] "What is additionality? Part 3: Implications for stacking and unbundling." Prepared by Michael Gillenwater, Greenhouse Gas Management Institute (2011): 1-14, White paper. Available online at http://ghginstitute.org/wp-content/uploads/content/GHGMI/AdditionalityPaper_Part-3%28ver3%29FINAL.pdf .

[19] Fox, Gardner, and Maki 2011

III. Case Studies

Survey respondents from the 2011 EPRI survey identified a handful of examples of credit stacking. Only one project, operated by Environmental Banc and Exchange (EBX), was identified as having sold multiple credits from the same geographic area, raising the question of whether the other cases identified truly represent credit stacking scenarios. Nevertheless, the cases are presented below, as they are the most often cited examples of credit stacking, and they serve to illustrate the concepts and issues discussed above.

A. Environmental Banc and Exchanges (EBX)

The 2011 EPRI survey identified only one project from which stacked credits had been sold in different environmental credit markets to offset impacts from multiple projects. In 2000, EBX sold wetland credits from its Neu-Con Bank to the North Carolina Department of Transportation. Nine years later, it sold nutrient offset credits (i.e., water quality credits) associated with the same conservation action to the North Carolina Ecosystem Enhancement Program. This transaction was criticized by some observers as an example of "double dipping," and as a result North Carolina placed a moratorium on certifying nutrient offset credits on land previously used to produce wetland credits.[20,21] At the time that EBX sold the water quality credits, the state of North Carolina had no regulations in place governing this type of credit stacking. According to local experts, if all other existing, already-sold mitigation sites are allowed to stack nitrogen credits, the nutrient credit market could be flooded with 1.1 million pounds of nitrogen credits, exceeding all credits generated since the program began in 2001.[22]

B. Species / Wetland Banks

Respondents to EPRI's 2011 survey identified wetland and species credits as the most common stacking scenario. Van Vleck Ranch Mitigation Bank in California, for example, offers vernal pool fairy shrimp credits for sale and vernal pool (wetland) credits, some of which arise from the same parcel of land. These overlapping credits, which represent acres of habitat, cannot be unbundled and sold first for species mitigation and second for wetland mitigation, or vice versa. Accordingly, once the species or wetland credit associated with a particular parcel has been sold (separately or jointly to offset the impacts of a single project), that parcel effectively is retired from the mitigation markets.[23]

C. Willamette Partnership

The Willamette Partnership (WP) in Willamette, Oregon uses a "multi-credit approach," based on a "function-based" accounting system for multiple credits to facilitate transactions of different credit types across different mitigation credit markets. Multiple local regulatory agencies who oversee the trading of these environmental credits reportedly support WP's multi-credit approach. Under WP's program, a "General Crediting Protocol" allow[s] a single process to

[20] Fox Gardner and Maki 2011

[21] 15A NCAC 02B .0295. Available at: http://portal.ncdenr.org/c/document_library/get_file?p_l_id=1169848&folderId=1727035&name=DLFE-26311.pdf .

[22] Cooley and Olander 2012, p.14

[23] Fox Gardner and Maki 2011

generate four different environmental credit types: (i) salmonid habitat; (ii) upland prairie habitat; (iii) wetland; and, (iv) water quality/temperature.[24] According to WP, The Protocol provides market participants (e.g., managers, buyers, sellers, and third parties) with the overall process and framework they need to develop, sell, and buy ecosystem credits in the Willamette River Basin using the functions-based accounting system developed as part of the Willamette Partnership's Counting on the Environment process. The Protocol describes an integrated, functions-based accounting system that includes the rules governing trades and the metrics required for quantifying ecosystem benefits and impacts.[25]

Willamette's Protocol generates multiple credit types on one geographic area, but reduces the remaining credits by a proportionate amount when one type of credit is sold. As a result, WP's Protocol implicitly does not allow the sale of multiple credits generated from conservation practices implemented in the same geographic area. In addition to a crediting protocol, the WP's program has a verification protocol, an online Ecosystem Crediting Platform, and a credit registry implemented by Markit Environmental Registry. The program includes six pilot projects. Although wetland, salmon and water temperature credits have been created as part of this program, only wetland credits actually have been sold.[26,27]

D. Ohio River Basin Water Quality Trading Project

The EPRI Ohio River Basin Water Quality Trading Project is a first-of-its-kind regional multi-credit trading program. It represents a comprehensive approach to designing and developing markets for nitrogen, phosphorus and GHG emissions offset credits. This program was launched in October 2009 in conjunction with USDA, US EPA and state regulators in the Ohio River Basin region. The scale of the project is large enough to have the potential to significantly improve regional water quality, and serve as a large test-bed for pilot water quality credit trading. The project intends to provide the technical basis for resolving key issues to determine the efficacy of water quality trading. These issues include: quantifying credits; demonstrating the viability of watershed modeling as a basis for trades; establishing technically sound, yet reasonable verification and monitoring requirements for credit generation; demonstrating the viability of interstate trades; testing the likelihood of stacking GHG emissions and water quality credits; and other issues.[28]

In addition, since 2008, EPRI has been involved in a separate project with Michigan State University (MSU) to facilitate development of GHG emissions offsets in the agricultural sector by developing a scientifically robust GHG emissions offsets protocol that makes it possible to develop GHG emissions offsets from projects that reduce nitrogen fertilizer use in crop production and so avoid nitrous oxide (N_2O) emissions. In 2012, the MSU-EPRI *Methodology*

[24] SpeciesBanking.com, http://www.speciesbanking.com/program/willamette_multicredit_watershed_market

[25] "Ecosystem Credit Accounting: Pilot General Crediting Protocol Willamette Basin Version 1.1." Willamette Partnership (2009): 1-39, White paper, http://willamettepartnership.ecosystemcredits.org/docs/General_Crediting_Protocol_1.1.pdf

[26] Willamette Partnership website, http://willamettepartnership.org

[27] Conservation Registry website, 'Collaboration Willamette Partnership and Oregon Department of Forestry' entry, http://www.conservationregistry.org/projects/17178

[28] EPRI 2011. "Water Quality Trading: Pilot Trades for Compliance with Nutrient Criteria and Greenhouse Gas Targets" Product ID: 1022644 Project ID: 071650

for Quantifying Nitrous Oxide (N2O) Emission Reductions from Reduced Use of Nitrogen Fertilizer on Agricultural Crops was approved by the American Carbon Registry (ACR 2012[29]), and substantial portions of this protocol also were incorporated into CAR's recently approved NMPP v1.0 (CAR 2012). In addition, the MSU-EPRI protocol has completed the Verified Carbon Standard's (VCS) Double Approval Process, and EPRI anticipates this protocol will be approved by the VCS in the near future.

These two EPRI research projects are collaborating with one another to explore the issues associated with stacking of environmental offset credits. The implementation of on-farm projects that reduce nitrogen fertilizer use in the Ohio River Basin have the potential to create both GHG emission offsets based on the ACR or CAR nitrogen management offset protocols, and water quality credits as part of the OH River Basin Water Quality Trading Program.

IV. Recent Developments

Little progress in recent years has been made on the development of offset protocols that specifically address the issue of credit stacking in a practical manner. The one significant exception to this has been the development and publication of the CAR's NMPP v1.0, which includes a discussion of both credit and payment stacking.

Over the past year or so, the CAR held multiple subcommittee meetings to discuss the potential for stacking water quality credits and GHG emission offsets and/or payments as part of the development of the NMPP v1.0. CAR published NMPP version 1.0 on June 27, 2012.[30]

The NMPP notes that there were no active water quality trading markets in the U.S. at the time of release, and therefore "…credit stacking is not addressed by the protocol at this time." The protocol does note that "[CAR] will continue to track the development of relevant WQTP [water quality trading programs] and will update this section as programs are implemented."

In addition, the CAR protocol discusses issues associated with payment stacking with reference to the USDA Farm Bill programs, such as the Conservation Reserve Program (CRP), Wetlands Reserve Program (WRP), the Environmental Quality Incentives Program (EQIP), and the Agricultural Water Enhancement Program (AWEP). The NMPP seeks to address two basic scenarios related to these Farm Bill conservation programs.

The first scenario is a situation in which a farmer receives payments for activities *other than* reduced fertilizer application. In this case, the NMPP concludes "…those payments do not affect field eligibility since the payments were awarded for different activities than those credited by this protocol and are therefore not considered 'stacked'."

The second scenario addresses a situation in which a farmer receives Farm Bill payments *to reduce* fertilizer application, based on the Natural Resource Conservation Service's (NRCS) Conservation Practice Standard 590 – Nutrient Management (CPS 590). In this case, the NMPP incorporates several limitations and requirements for offset projects to be eligible to receive

[29] Methodology for Quantifying Nitrous Oxide (N2O) Emission Reductions from Reduced Use of Nitrogen Fertilizer on Agricultural Crops v.1, American Carbon Registry, July 2012. Available online at http://americancarbonregistry.org.

[30] "Nitrogen Management: Project Protocol Version 1.0." Climate Action Reserve (2012): 18-20. http://www.climateactionreserve.org/how/protocols/nitrogen-management/

GHG emission offset credits. The NMPP notes that carbon financing could incentivize additional action above Farm Bill payments, as implementation of CPS 590 is low: "…no state eligible under this protocol has more than two percent of cropland acres receiving NRCS funding under CPS 590, suggesting that existing payments are not adequate to further incentivize nitrogen application reductions." So with regards to CPS 590, the NMPP appears to allow payment stacking, but with the following important limitations:

- Payment stacking is not allowed if the field already had a signed agreement for a nutrient management plan;
- If a project is part of a conservation cost-sharing arrangement, payment stacking is not allowed for that portion of the project funded by public dollars. "If a farmer receives an EQIP payment for CPS 590 at the 50 percent level, the number of CRTs [Climate Reserve Tonnes] issued is to be reduced by 50 percent."

Aside from the CAR NMPP, there has been no concrete policy developments related to credit or payment stacking that we are aware of at this time. However, respondents in the 2011 EPRI survey found "interest in the concept of stacking is high, with 73.6% of respondents stating that they are either already involved in credit stacking, or that they are interested in getting involved in the future (producing, purchasing, selling, regulating, verifying, buying, monitoring, researching, tracking, and/or trading)."[31]

V. Benefits and Barriers to Credit Stacking

The potential benefits of credit stacking can be understood from two perspectives: that of a landowner and/or offset project developer, and the ecosystem itself. Some of the key barriers to more widespread credit stacking are additionality, regulatory policies, and transaction-related issues.

A. Potential Benefits

> *"The ability to stack credits will increase voluntary incentives for landowners to participate and more beneficial practices will be voluntarily provided."*
> *–Anonymous survey respondent, EPRI 2011 U.S. National Opinion Survey on Stacking Environmental*

The most frequently-cited benefit of credit stacking is the **financial benefit** that may accrue to the landowner or offset credit developer (e.g., mitigation bankers or carbon offset project developers) of stacked projects. Credit stacking can provide multiple income streams to a landowner or project developer who provides multiple ecosystem services. EPRI's survey confirms the expectation that stacking can provide additional financial benefits: "70% of respondents whose organizations are involved in credit stacking believed that it increased the financial value of their projects."[32] In theory, credit stacking could provide the marginal financial benefit a landowner or offset developer might need to conserve their land or invest in a carbon offset project. One recent academic journal article found that credit stacking theoretically could increase landowner participation.[33] Finally, there could be potential additional financial benefits

[31] Fox, Gardner, and Maki 2011

[32] EPRI 2011, p. 3-4

[33] Richard Woodward. "Double-dipping in environmental markets." Journal of Environmental Economics and Management Vol 61:2 (2011), p. 153-169.

to credit *buyers*. Stacked credits potentially can increase the supply of offset credits in a given environmental market leading to lower-priced emissions allowances and offset credits. For example, this may be true for credit stacking projects that create GHG offset credits along with other environmental credits such as water quality credits.

However, the primary goal of environmental credit markets and conservation payments is not to provide income to landowners or credit developers. The financial incentives are only a means to achieve economically viable mitigation of ecological impacts and emissions.

> *"…if we are able to stack credits, then we may engineer a project that blends carbon, species and water quality. The sum total of these stacked credits may generate higher economic value and a great value to the ecosystem services provided."*
> *–Anonymous survey respondent, EPRI 2011 U.S. National Opinion Survey on Stacking Environmental Credits*

Therefore, it is critical to evaluate credit stacking in terms of potential **ecological benefits.** Credit stacking theoretically could incentivize more ecologically-holistic land management. For example, monoculture tree-planting to generate GHG offsets from carbon sequestration likely would have lower ecological value than managing the same forest land to provide multiple ecosystem services. Credit stacking potentially could lead to implementation of higher-quality projects that might not be cost-effective based on a payment stream from a single type of mitigation credit. Finally, credit stacking could incentivize more participation in environmental credit markets and conservation payment programs, and perhaps increase overall conservation. This would only be the case if the amount of mitigation credits created is actually *less than* the actual amount of environmental mitigation achieved by the credited activity.[34]

In EPRI's credit stacking survey, respondents exhibited open-mindedness with regards to the potential ecological benefits of credit stacking: "83.9% survey respondents stating that there is either a "positive" ecological benefit or that "it depends" on the details of the stacking scenario," as shown in Figure 3 below.[35] Responses from respondents identified as policy-makers, however, were markedly less enthusiastic. Among policy-makers, only 27% thought that credit stacking resulted in positive ecological value. [36]

[34] Offsets, particularly in the world's evolving carbon markets, are issued for projects that reduce GHG emissions outside of the geographic area or industrial "scope" of activities covered by a corresponding GHG cap-and-trade emissions program. Typically, GHG offsets do not increase the amount of *aggregate* emissions reductions, as GHG offsets are used to substitute for more costly emissions reductions in the "covered" economic sectors on a one-for-one basis.

[35] Fox, Gardner, and Maki 2011

[36] EPRI 2011, p. 5-6

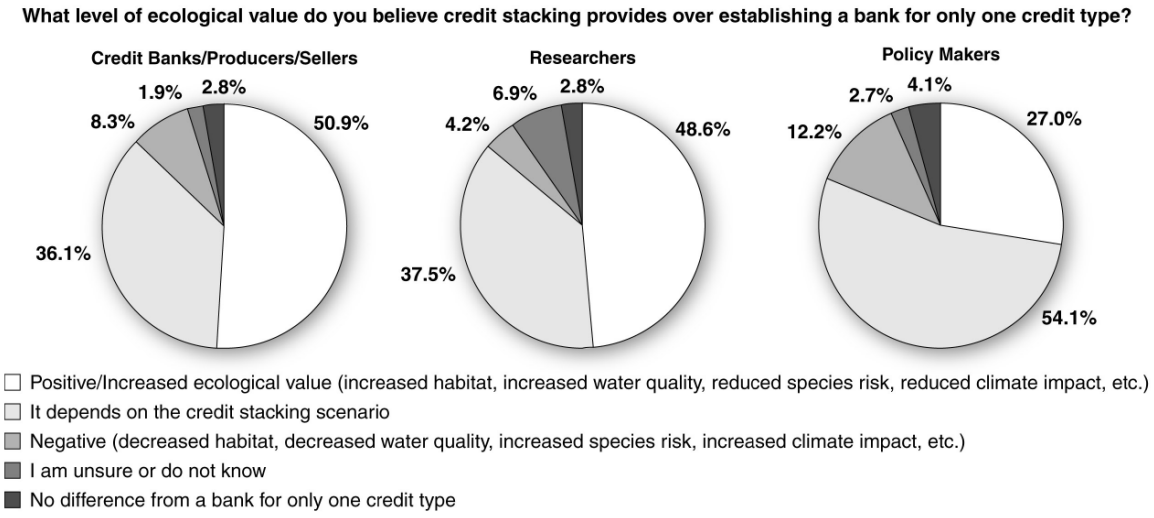

Figure 3
Results of National Survey on Ecological Value of Credit Stacking *(from Fox, Gardner, and Maki 2011)*

B. Barriers

There is little debate that a conservation project can create multiple ecosystem benefits. What becomes contentious is when more than one credit type is sold in different environmental markets to offset multiple activities. The biggest policy issue to be addressed in this context is *additionality* – that is, whether there are additional ecological benefits from the project activity, and if they would have occurred without the credit or payment. Ecological additionality is a critical component of environmental credit markets. Other key issues to be relate to practical issues of credit stacking, including public policy, stacking guidance and/or protocols, robust verification for stacked credits, and effective tracking of stacked credits.

B.1 Additionality

> *"Unless the project would not proceed without funding from both credits, stacking is redundant."*
> *–Anonymous survey respondent, EPRI 2011 U.S. National Opinion Survey on Stacking Environmental Credits*

The term "additionality" refers to a critical offset criterion widely adopted in the world's evolving carbon markets. A GHG emission reduction project designed to create GHG offsets is considered to be "additional" if the reductions created by the project activity would not have occurred *but for* the implementation of the project and the incentives created by the offset program. This means that the project activity creating the offsets would not have been implemented under the "Business-as-Usual" (BAU) scenario. It is generally agreed that GHG offsets should not be awarded to non-additional emission reduction projects because doing so would provide credit for emission reductions that otherwise would be expected to occur under BAU. Providing non-additional projects with offsets would jeopardize the environmental integrity of the GHG emissions cap in a cap-and-trade program—or any environmental market credit intended to offset impacts.

The concept of additionality is easy to understand in theory, but difficult to apply in practice because there is no analytic way to prove additionality. A number of different "additionality tests" – i.e., tests designed to demonstrate that an offset project is additional – have been

developed and used in existing programs or proposed for use in offset programs under development. Table 1 summarizes several of these additionality tests as discussed by Trexler, Broekhoff, and Kosloff, 2006.[37, 38, 39]

> *"…each dollar spent paying a project participant more than what he or she needs to recoup costs stops inducing the behavioral change entailed by the project and is a dollar that cannot be spent to fund another ecosystem services project."*
> *–Anonymous survey respondent, EPRI 2011 U.S. National Opinion Survey on Stacking Environmental Credits*

Although there is no uniform policy on additionality as it relates to credit stacking, a potential lack of additionality is the key theoretical criticism of credit stacking. In some cases, the stacking of credits may fail some of the additionality tests shown in Table 1. For example, if wetland credits are sold, and later water quality credits are sold from the same land under the same management activity, the project likely would fail the investment test. Environmental credits are intended to offset impacts to meet regulatory compliance obligations. Without ecological additionality, credits may not adequately compensate for impacts. The majority of EPRI survey respondents thought that credit stacking *could* provide positive ecological value in certain circumstances. However, Fox et al (2011) noted "our research revealed no papers, peer-reviewed or otherwise, that verified the ecological foundation for transactions involving stacked credits."[40]

A lack of additionality also invites criticism that conservation funds may not have been used to promote cost-effective programs and projects. When funding for conservation activities is limited, credit stacking can reduce the effectiveness of conservation payments by paying twice for the same conservation action. The question that critics may ask is "Why should society pay twice for conservation management activities on one acre of land, when we could pay for two acres of management activities?" Accordingly, both credit stacking and payment stacking activities easily could fail to be additional if they are assessed solely on the basis of an investment test. On the flip side, however, one can ask, "Why should a landowner or offset credit producer not receive multiple payments if they are producing multiple environmental benefits?"

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[37] For a more complete discussion of additionality, see *Overview of Different Approaches for Demonstrating Additionality of Greenhouse Gas Emissions Offset Projects,* Background Paper for the EPRI Greenhouse Gas Emissions Offset Policy Dialogue Workshop 2, Natsource Advisory and Research Services and the Electric Power Research Institute (2008). Available online at http://mydocs.epri.com/docs/PublicMeetingMaterials/0809/6CNS9RLUQLS/404416__E230717_Additionality_EPRI%20Workshop2_090208_Final.pdf

[38] Table 1 in Trexler, Broekhoff and Kosloff, "A Statistically-Driven Approach to Offset-Based GHG Additionality Determinations: What Can We Learn?" in Sustainable Development Law & Policy, Winter 2006.

[39] More recently, Gillenwater (2012) has attempted to more precisely define the terms "additionality" and "baseline" in the context of environmental policy and propose a conceptual framework for applying these concepts within offset programs. See http://ghginstitute.org/2012/01/25/how-do-you-explain-additionality/ .

[40] Fox, Gardner, and Maki 2011

Test	Basis for Determining Additionality
Legal, Regulatory, or Institutional Test	Does the project reduce GHG emissions below the level required by official policies, regulations, guidance, or industry standards? If not, it is not additional. If so, it may be additional (typically other tests are used to determine additionality).
Technology Test	Does the project involve a technology that is specifically identified as not being "business as usual?" If so, it is additional.
Investment Test	Would the project economically unfeasible, or its rate of return unattractive, without the revenue associated with offset credits to be created by the proposed project? If so, it is additional.
Barrier Test	Are there significant barriers to implementing a project – such as local resistance to new technologies – in the absence of revenue from GHG reductions? If so, it is additional.
Common Practice Test	Does the project achieve greater emission reductions than other "common practice" technologies/activities in the relevant sector and region? If so, it is additional.
Timing Test	Was the project initiated after a certain date? If not, it is not additional. If so, it may be additional (typically other tests are used to determine additionality). The assumption is that projects starting before the specified date must have had motivations other than GHG reductions.
Performance Benchmark Test	Does the project have an emissions rate that is lower than a predetermined benchmark emissions rate for the particular technology or activity? If so, it is additional.
Project In, Project Out Test	Does the project have lower GHG emissions than a scenario in which the project has not been implemented? If so, it is additional.

Table 1
Examples of Additionality Tests (derived from Trexler, Broekhoff, and Kosloff, 2006).

B.2 Multiple Agencies and Jurisdictions

Environmental credit markets are created for their own purposes and "agency rules regarding the relationship between environmental credit markets are not clear and sometimes conflicting."[41]

Today, different state and federal regulatory agencies are involved in regulating different environmental impacts and environmental credit markets. Given the range of agencies involved, it can be very difficult to coordinate their approaches and activities related to credit stacking. Below we briefly highlight key mitigation credit programs and the role of key federal and state regulatory agencies that are involved in managing these programs.

Water quality credits – The U.S. EPA oversees water quality trading, unless authority has been delegated to individual states. Water quality credits typically represent pounds (lbs) of nitrogen (N) or phosphorous (P) reduction or stream temperature reduction. In contrast to some other environmental market credits, water quality credits generally are created annually to correspond to pollution discharge limits. The EPA's 2003 Water Quality Trading Policy "supports the creation of water quality trading credits in ways that achieve ancillary environmental benefits beyond the required reductions in specific pollutant loads, such as the creation and restoration of wetlands, floodplains and wildlife and/or waterfowl habitat."[42] Fox et al (2011) note that the policy is silent on "whether the producer of the water quality credits retains the right to sell credits associated with the ancillary benefits (carbon sequestration, endangered species habitat, etc.)."

> *"Few functions can be stacked where wetland mitigation credits are assigned because wetland credit typically assumes the 'use' of several environmental services provided on a given acre."*
> *– Anonymous policy-maker survey respondent, EPRI 2011U.S. National Opinion Survey on Stacking Environmental Credits*

Wetland and stream credits – The U.S. Army Corps of Engineers (Corps) is the federal agency with lead regulatory responsibility for wetland and stream mitigation for compliance with section 404 of the Clean Water Act (CWA), and many states have similar programs. Since wetland and stream mitigation is meant to compensate for losses of bundled "aquatic resource functions," some scholars and environmental market participants have concluded that stacking should not be permitted on top of wetland mitigation credits.[43,44] Language contained in CWA regulations is consistent with this view. Although the regulations state that "[c]ompensatory mitigation projects may also be used to provide compensatory mitigation under the Endangered Species Act or for Habitat Conservation Plans,"[45] the regulations also emphasize that "under no circumstances may the same credits be used to provide mitigation for more than one permitted activity."[46] So, while establishing wetland and species

[41] Fox Gardner and Maki 2011

[42] US EPA, Final Water Quality Trading Policy (Jan. 13, 2003)

[43] Cooley and Olander 2012, p. 14

[44] "National Forum on Synergies between Water Quality Trading and Wetland Mitigation Banking [Summary Report]." Environmental Law Institute (2006): see p. 51, White paper, http://www.elistore.org/reports_detail.asp?ID=11125

[45] Compensatory Mitigation for Losses of Aquatic Resources; Final Rule, 33 CFR § 332.3(j)(3), http://water.epa.gov/lawsregs/guidance/wetlands/upload/2008_04_10_wetlands_wetlands_mitigation_final_rule_4_10_08.pdf

[46] 33 CFR § 332.3 (j)(1)(ii)

credits on the same overlapping area is allowed, the credits may not be unbundled and sold independently to offset different development activities. Other language relates to payment stacking, and prohibits creation of wetland or stream credits from projects that used federal funding such as Farm Bill conservation payments: "federally-funded aquatic resource restoration or conservation projects undertaken for purposes other than compensatory mitigation, such as the Wetlands Reserve Program, Conservation Reserve Program, and Partners for Wildlife Program activities, cannot be used for the purpose of generating compensatory mitigation credits for activities authorized by permits."[47] The preamble to the regulations, however, clarifies that credits may be authorized if the landowner provides additional investment:

> *"For example, if a federal program has a 50% landowner match requirement… if the landowner provides a greater than 50% match, any improvements provided by the landowner over and above those required for federal funding could be used as compensatory mitigation credits."*[48]

Species credits – The U.S. Fish and Wildlife Service (FWS), along with state departments of fish and game, approve conservation banks (i.e., species credit banks). A species credit may or may not bundle multiple ecosystem functions or values. For example, a mussel may be dependent upon water quality, so that function is implied in the credit.[49] Like language contained in wetland mitigation regulations, the 2003 Guidance for Conservation Banking generally prohibits species credits from lands that have already received federal funding for restoration or protection.[50]

GHG emissions offsets – Guidance and protocols in use in the voluntary carbon market (with the exception of the CAR NMPP v1.0), regulations for the Regional Greenhouse Gas Initiative (RGGI) in the U.S. Northeast, and the proposed federal comprehensive climate program proposed in the American Clean Energy and Security Act (ACES) have all been silent on the issue of credit stacking.[51] As note earlier, the CAR recently discussed payment and credit stacking in its NMPP v1.0, but did not decide to allow or prohibit these activities at the time of its publication. Also, as noted earlier, GHG offsets programs in evolving carbon markets routinely include criteria for assessing project additionality.

While there has yet to be a project that we are aware of that has sought to stack GHG emissions offsets along with other environmental mitigation credits, there are some projects in the works. The Ohio River Basin Trading project is planning to test the stacking water quality credits and GHG offsets. In addition, we are aware of a Florida conservation bank that has reserved the rights to carbon credits in the future. Also, in its updated Climate Action Plan, the Maryland Commission on Climate Change contemplates a water quality trading program that also

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[47] 33 CFR § 332.3(j)(2)

[48] Federal Register 73 (10 April 2008): p.44, http://water.epa.gov/lawsregs/guidance/wetlands/upload/2008_04_10_wetlands_wetlands_mitigation_final_rule_4_10_08.pdf

[49] "Carolina Heelsplitter Conservation Bank Factsheet." The Conservation Fund (2010): 1-5, White paper, http://www.fws.gov/charleston/pdf/Heelsplitter/Carolina%20Heelsplitter_ConservationBank_FactSheet.pdf

[50] FWS, Guidance for the Establishment, Use, and Operation of Conservation Banks (2 May 2003), http://www.fws.gov/endangered/esa-library/pdf/Conservation_Banking_Guidance.pdf

[51] Cooley and Olander 2012, p. 10

generates carbon credits for use under the state's recently enacted Greenhouse Gas Reduction Act.[52]

Conservation payments – The U.S. Department of Agriculture (USDA) provides payments to landowners who adopt conservation activities through funding provided by the Farm Bill. Total conservation payments amount to $3-5 billion annually.[53] The CRP, WRP, and EQIP programs all allow for the sale of environmental credits by the landowner (provided the credits are consistent with the purposes of the programs).[54, 55 ,56]

Multiple environmental credit and payment programs – The USDA Office of Environmental Markets (OEM) was created in response to the 2008 Farm Bill. This USDA office was established "to facilitate the participation of America's farmers, ranchers, and forest landowners in environmental markets." The office does not currently provide official guidance on credit stacking, although it "is building national environmental market infrastructure, supporting regional market innovation, and fostering collaboration around market-based conservation within USDA and across the federal government." [57]

Because of the multiple jurisdictions and regulatory agencies involved in environmental credit markets, there is the possibility that projects would "overdraft" ecosystem services. For example, a mitigation bank selling both species and carbon offset credits would need to be responsive to several different regulatory agencies and legal jurisdictions involved. In addition, the program registries used to account for these mitigation credits would have to be managed in such a way that it would be clear regarding whether a project sold each acre for species only, carbon abatement only, or species and carbon, and that no double counting resulted.[58] While there is some track record of joint Corps/FWS oversight of mitigation banking for both species and wetland credits, generally U.S. regulatory agencies have an inconsistent record with regards to tracking and providing transparency on environmental credit transactions. As Fox (2008) notes: "the task of establishing relationships across currently uncoordinated agency offices is substantial. Unless it is possible to establish protocols that sidestep the need for agency coordination, it is reasonable to predict issues with tracking and monitoring banks that sell multiple credit types."[59]

Despite these difficulties, around one-third of policy-makers in the 2011 EPRI survey said that their organizations were involved with stacked credits, while two-thirds of policy-makers "indicated that they believed their organizations would become involved in credit stacking in the

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[52] Fox Gardner and Maki 2011

[53] Congressional Research Service, Actual Farm Bill Spending and Cost Estimates (13 December 2010), R41195. http://www.nationalaglawcenter.org/assets/crs/R41195.pdf

[54] 7 CFR § 1410.63, http://www.gpo.gov/fdsys/pkg/CFR-2011-title7-vol10/xml/CFR-2011-title7-vol10-sec1410-63.xml

[55] 7 CFR § 1466.36, http://www.gpo.gov/fdsys/pkg/CFR-2011-title7-vol10/xml/CFR-2011-title7-vol10-sec1466-36.xml

[56] 7 CFR § 1467.20, http://www.gpo.gov/fdsys/pkg/CFR-2011-title7-vol10/xml/CFR-2011-title7-vol10-sec1467-20.xml

[57] USDA OEM website. http://www.usda.gov/oce/environmental_markets/index.htm

[58] Fox 2008, p.179

[59] Fox 2008, p.179

future."[60] Policy-makers noted "that they are most familiar with species and wetland, and wetland and water quality credit stacking scenarios." Finally, 41% of policy-makers indicated that they were not aware of stacking scenarios which have regulations or policy guidance pending.[61]

B.3 Protocols, Verification, and Tracking

In order for credit stacking to be used more widely in practice and overcome doubts about its environmental efficacy, it will be necessary to develop guidance and protocols that ensure for additionality, necessary verification, and rigorous tracking of stacked credits. These protocols could take many forms, including as standalone documents or integrated into existing offset policies, protocols and guidance. Aside from the section of the CAR NMPP related to stacking, we are not aware of other existing guidance or offset methodologies that have tried to address the stacking of environmental mitigation credits.

The Willamette project includes a protocol, accounting system, and an online trading registry that can account for multiple credit types and avoids double counting. However, as discussed above, the approach adopted by the WP would not be considered stacking based on the consensus definition from the 2011 EPRI survey.[62] The Ohio River Basin Water Quality Trading project will need to develop credit stacking guidance and/or protocols to ensure the environmental credits created as part of this program are additional so both carbon offset and water quality credits can be generated and sold from the same conservation projects. [63] Methods to conduct clear monitoring and verification of stacked credits also must be developed. Further, verification and monitoring practices will need to be implemented to ensure the conservation practices are appropriate for generating both credit types.

VI. Next Steps

As the EPRI survey demonstrated, there is significant interest in the concept of credit stacking. In contrast, however, there is a paucity of real-life examples of stacked credits that have been unbundled and sold in different mitigation markets. Despite the growing experience with multiple mitigation credit markets, policy makers and practitioners have yet to develop standards or protocols that provide clear guidance related to when and under what conditions stacking and unbundling are appropriate. In part this situation may be explained due to the variety of different stacking scenarios, the complexity of the metrics, the number of different approaches that can be taken to evaluate project additionality, and the multiplicity of regulatory bodies involved. It is also likely a result of concerns that some stacking scenarios might lead to an overall *net loss* of ecosystem services.

A pathway towards developing a credit stacking protocol or comprehensive guidance would require development of general principles, resolution of the specific issue of additionality, development of a robust multi-credit accounting system, robust verification and monitoring

[60] EPRI 2011, p. 5-2 – 5-8

[61] EPRI 2011, p. 5-5

[62] Willamette Partnership, Ecosystem Crediting Platform (online), http://willamettepartnership.ecosystemcredits.org/information/registration

[63] EPRI, Ohio River Basin Trading Project (website), http://my.epri.com/portal/server.pt?open=512&objID=423&mode=2&in_hi_userid=2&cached=true

approaches, and implementation of one or more pilot projects to test the application of these principles and standards.

To develop appropriate credit stacking principles and standards, it may be helpful to consider the following questions. Moving credit stacking from a theoretical discussion to actual practice likely will depend on how these and other related questions are resolved. It is one of the goals of this EPRI workshop to facilitate a process by which agencies, practitioners, researchers and other key stakeholders can begin to resolve these questions through collaborative discussions.

- Are there circumstances under which credit stacking (and thus unbundling credits to sell in multiple markets) should always be *prohibited*? For example, should credit stacking be precluded when acres of habitat is the credit metric?

- Are there circumstances under which credit stacking should always be *permitted*? For example, should credit stacking be permitted when the credits are based on specific pollutants, with metrics tied to pounds, tons or similar measurements?

- Should additionality be required for credit stacking? What is the appropriate test or tests to employ to determine additionality for credit stacking? Should the tests differ depending on the environmental credit markets involved?

- Is credit stacking necessary to create further conservation incentives? Even if credit stacking is not a necessary incentive at this point in time, should that be relevant to the development of stacking guidelines?

- How can the ecological benefits of credit stacking be verified?

- What are the next steps required to proceed with a large-scale pilot project to test the application of credit stacking principles?

- Which credit stacking scenarios offer the greatest opportunity to promote cost effective conservation of ecosystem services and provide return on investment for landowners and offset credit developers?